

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

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08 JUN 2000

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To:

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## NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing  
(day/month/year)

06.06.2000

Applicant's or agent's file reference  
F036887PGB

### IMPORTANT NOTIFICATION

International application No.  
PCT/GB99/00839

International filing date (day/month/year)  
18/03/1999

Priority date (day/month/year)  
26/03/1998

Applicant  
MERITOR HEAVY VEHICLE BRAKING SYS(UK)Ltd.et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

#### 4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/



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D-80298 Munich  
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# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>E036887PGB</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/GB 99/ 00839</b>	International filing date (day/month/year) <b>18/03/1999</b>	(Earliest) Priority Date (day/month/year) <b>26/03/1998</b>
Applicant  <b>MERITOR HEAVY VEHICLE BRAKING SYSTEMS (UK) LIMITED</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

### 1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

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☐ None of the figures.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/GB 99/ 00839

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

Line 3+4: insert after "element" "(31)"  
line 5: insert after "part" "(25)"  
insert after "seal" "(33)"

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/00839

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 F16J15/32 F16D65/00 F16D65/56 F16D65/16

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 F16J F16D B61H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	DE 43 34 914 A (KNORR-BREMSE SYSTEME FÜR NUTZFAHRZEUGE) 20 April 1995  see column 2, line 60 - line 64 see column 7, line 32 - line 61; figure 1B ---	1, 2, 5, 6, 9, 10, 13, 14, 17 3, 7, 11, 15
X A	US 4 502 572 A (DAVIDSON ET AL.) 5 March 1985  see column 5, line 41 - column 6, line 40; figures ---	1, 9, 17  5, 13
X	FR 2 593 570 A (GUDIN) 31 July 1987 see the whole document ---	1, 2, 5, 6
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

29 June 1999

Date of mailing of the international search report

07/07/1999

Name and mailing address of the ISA

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NL - 2280 HV Rijswijk  
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Authorized officer

Becker, R

# INTERNATIONAL SEARCH REPORT

In: .tional Application No

PCT/GB 99/00839

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	GB 1 558 148 A (TOKICO) 19 December 1979 see page 2, line 57 - line 104; figures ---	1,9,17 5,13
X A	US 3 490 343 A (AFANADOR ET AL.) 20 January 1970 see column 3, line 74 - column 4, line 17; figure 3 ---	1,9,17 5,13
X A	US 4 506 768 A (INNOCENT) 26 March 1985 see column 4, line 3 - line 10; figure 3 -----	1,9,17 5,13

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 99/00839

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 4334914 A	20-04-1995	BR 9404064 A EP 0648952 A JP 2857071 B JP 7158671 A US 5568845 A	13-06-1995 19-04-1995 10-02-1999 20-06-1995 29-10-1996
US 4502572 A	05-03-1985	AU 574372 B AU 3143584 A BR 8404208 A CA 1226531 A DE 3475422 A EP 0139117 A JP 60073140 A	07-07-1988 07-03-1985 23-07-1985 08-09-1987 05-01-1989 02-05-1985 25-04-1985
FR 2593570 A	31-07-1987	NONE	
GB 1558148 A	19-12-1979	BR 7704695 A	28-03-1978
US 3490343 A	20-01-1970	NONE	
US 4506768 A	26-03-1985	AU 523262 B AU 3781278 A BR 7804660 A DE 2832007 A FR 2398232 A GB 2001710 A, B JP 54023862 A ZA 7803801 A	22-07-1982 10-01-1980 06-03-1979 08-02-1979 16-02-1979 07-02-1979 22-02-1979 25-07-1979

# PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>F036887PGB</b>	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. <b>PCT/GB99/00839</b>	International filing date (day/month/year) <b>18/03/1999</b>	Priority date (day/month/year) <b>26/03/1998</b>
International Patent Classification (IPC) or national classification and IPC <b>F16J15/32</b>		
Applicant <b>MERITOR HEAVY VEHICLE BRAKING SYS(UK)Ltd.et al.</b>		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This REPORT consists of a total of 8 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand  <b>08/10/1999</b>	Date of completion of this report  <b>06.06.2000</b>
Name and mailing address of the international preliminary examining authority:   <b>European Patent Office</b> <b>D-80298 Munich</b> <b>Tel. +49 89 2399 - 0 Tx: 523656 epmu d</b> <b>Fax: +49 89 2399 - 4465</b>	Authorized officer  <b>Zebst, M</b>  Telephone No. <b>+49 89 2399 7313</b>



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB99/00839

**I. Basis of the report**

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

**Description, pages:**

1-7 as originally filed

**Claims, No.:**

1-16 as received on 04/05/2000 with letter of 03/05/2000

**Drawings, sheets:**

1/3-3/3 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.  
☒ claims Nos. 1-7.

because:



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB99/00839

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

**see separate sheet**

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos. .

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims 8-14,15,16
	No: Claims
Inventive step (IS)	Yes: Claims
	No: Claims 8-14,15,16
Industrial applicability (IA)	Yes: Claims 8-14,15,16
	No: Claims

**2. Citations and explanations**

**see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB99/00839

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**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/GB99/00839

**Re Item I**

**1. Removal**

The applicant has deleted the following feature in claim 1 and in claim 8:

" *a support element (31) adapted to be carried externally by the sleeve (24)*"

This feature is presented as essential in the disclosure of the invention: the deletion of this feature introduces subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT and is therefore not admissible.

**2. Addition**

The applicant has added the following features in claim 1 and 8 which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT and is therefore not admissible, for the following reasons:

a) The expression "during axial movement of the shaft" is in contradiction with the helicoidal movement of the shaft relative to the sleeve, which is the only possible movement of the shaft as far as the disclosure of the invention is concerned.

b) - *externally threaded internal shaft*

- *arranged to engage an unthreaded surface portion of said shaft*

It appears clearly in the description on page 5 that *the shaft (25) has an internally threaded portion (25A)*, which is in contradiction with "*externally threaded internal shaft*", from which the skilled man in the art could understand that almost the hole length of the *internal shaft* is *externally threaded*. This meaning is however not disclosed in the application.

**Re Item III**

The features of new independent claim 1 are too broad and too speculative to define the subject-matter: there is no indication of the global shape nor of the properties of the "*seal device*". In other words, each support carrying a seal provided with a lip can be chosen to fulfil the requirements of claim 1. Such a definition applies for an huge type of seals, which are not addressed to by the application. This shows that the wording is too broad and extremely speculative.

All the remaining features present in claim 1 relate to either the preferred use of the seal or the technical results to be achieved by the seal when used with a specific construction. These features cannot be considered as defining the seal in itself.

In the current case, the subject-matter of the independant claim 1 does not appear to be appropriate to define the invention which consists merely in an assembly as defined in independent claim 8.

Claim 1 of the international application thus lacks compliance with Article 34(4)(ii) PCT, so that no meaningful opinion on novelty, inventive step or industrial applicability can be stated.

### Re Item V

1. The industrial applicability of the invention seems to be self-evident (article 33(4) PCT).
2. Reference is made to the following document:  
D1:DE-A-4334914

### 3. Novelty

#### 3.1. Claim 8

The document D1 is regarded as being the closest prior art to the subject-matter of claim 8, and shows (the references in parentheses applying to this document):

***An adjustable tappet assembly for a disc brake: see abstract; figure 2A, the assembly comprising***

- *an internally threaded outer sleeve (7) and an ~~externally threaded~~ internal shaft (70) housing an externally threaded portion, a seal device (80,81,82), the seal device having a support element (81-82) carried externally by the sleeve (7): see column 7, lines 32-61; figure 1A,*
- *the support element (81-82) carrying a seal (80), for sealing between the sleeve (7) and the shaft (70), having a lip portion arranged to engage a **threaded** surface portion of said shaft (70) in sealing relationship: see column 7, line 52-60; figure 1B. The feature "seal (80) having a lip portion" is vague and known from document D1, because the portion of the seal (80) in contact with the shaft (70) can be seen as carrying out this function.*

*for providing a high integrity seal during ~~axial~~ movement of the shaft (70) relative to the sleeve (7).*

The subject-matter of claim 8 therefore differs from this known document D1 in that the *"the lip portion is arranged to engage an **unthreaded** surface portion of said shaft (70)"*.

The subject-matter of claim 8 is therefore novel (Article 33(2) PCT).

#### 4. Inventive step

##### 4.1. Claim 8

Document D1, which is considered to represent the most relevant state of the art, discloses (cf. 3.1) a seal device from which the subject-matter of claim 8 differs in that *"the lip portion is arranged to engage an unthreaded surface portion of said shaft (70)"*.

The problem to be solved by the present invention may therefore be regarded as to provide a seal device suitable for providing a high integrity seal during actual movement of the shaft (70) relative to the sleeve (70).

Despite the primary function of the seal (80) ("Reibring") is to create a specific friction torque between the shaft (70) and the sleeve (70), a natural and low price solution for the man skilled in the art, in order to solve the technical problem could be to simply engage these seal on an unthreaded surface portion of the shaft (70) and to nevertheless lose his primary function mentioned above.

The solution proposed in claim 8 of the present application can therefore not be considered as involving an inventive step (Article 33(3) PCT).

##### 4.2. Dependent claims 9 to 14,15,16

Dependent claims do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, the reasons being as follows:

###### a) Claim 9

The features *"wherein an outer surface of the support element (81-82) serves, in use, to provide a smooth sealing surface for engagement by a lip portion of a further seal (91) carried by adjacent structure (2)"* are vague and can easily be read in document D1 by a person skilled in the art (column 7, line 45-53; figure 1B).

**b) Claims 10, 11, 13, 15 and 16**

The features of these claims are already disclosed in D1, see figures 1A and 2A.

**c) Claims 12 and 14**

Concerning the features of these claims, the shape of the cap or the shape of the seal is merely one of several possibilities from which the skilled man would select, in accordance with circumstances and the function demanded.

**Re Item VII**

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.
2. Independent claim 8 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

In the present case, the following features are known in combination from the document D1 and belong in the preamble of such a claim:

*"a support element adapted to be carried externally by the sleeve, the support element carrying a seal, for sealing between the sleeve and the shaft, having a lip portion"*

**Re Item VIII**

In order to keep things clear (article 6 PCT) and of constant terminology (rule 10.2 PCT), the term "*An adjustable tappet assembly*" related to claim 8 should also be utilised in the claims 9 to 14 in state of only "*An Assembly*".

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## CLAIMS

1. A seal device for use in sealing between parts of a thrust assembly of the disc brake, comprising a support element adapted to be carried externally by a first part of the thrust assembly, the support element carrying a seal arranged so that, with the support element in its position of use on the first part, the seal engages a surface of a second part of the thrust assembly in sealing relationship.
2. A seal device according to Claim 1, wherein an outer surface of the support element serves, in use, for engagement by a further seal carried by adjacent structure.
3. A seal device according to Claim 1 or Claim 2, wherein the support element is in the form of a cap having a generally annular skirt adapted to fit, in use, over an end portion of the first element, the outer surface of the skirt serving for engagement by said further seal.
4. A seal device according to Claim 3, wherein an annular base of the cap rests, in use, against the adjacent end of the first part of the thrust assembly with a portion of said second part extending through the base.
5. A seal device for use in sealing between parts of a thrust assembly of a disc brake, comprising a support element adapted to be carried by a first part of the thrust assembly, the support element carrying a seal arranged so that, with the support element in its position of use on the first part, the seal engages a surface of a second part of the thrust assembly in sealing relationship, the support element being arranged so

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that an outer surface thereof serves, in use, for engagement by a further seal carried by adjacent structure.

6. A seal device according to Claim 5, wherein the support element is carried externally by said first part of the thrust assembly.

7. A seal device according to Claim 5 or Claim 6, wherein the support element is in the form of a cap, having a generally annular skirt adapted to fit, in use, over an end portion of the first element, the outer surface of the skirt serving for engagement by said further seal.

8. A seal device according to Claim 7, wherein an annular base of the cap rests, in use, against the adjacent end of the first part of the thrust assembly with a portion of said second part extending through the base.

9. A thrust assembly of a disc brake comprising a pair of relatively movable parts, and a seal device which has a support element carried externally by a first of said parts, the support element carrying a seal arranged to engage a surface of a second of said parts in sealing relationship.

10. An assembly according to Claim 9, wherein an outer surface of the support element provides a sealing surface engaged, in use, by a further seal carried by adjacent structure.

11. An assembly according to Claim 9 or Claim 10, wherein the support element is in the form of a cap having a generally annular skirt fitted over an end portion of the first element, the outer surface of the skirt providing the sealing surface engaged by the further seal.



- 10

10. An assembly according to Claim 9, wherein the support element (31) is in the form of a cap having a generally annular skirt (30) fitted over an end portion of the sleeve (24), the outer surface of the skirt (30) providing the sealing surface engaged by the further seal (37).
11. An assembly according to any one of Claims 8 to 10, wherein the support element (31) is carried externally by said sleeve (24).
12. An assembly according to any one of Claims 8 to 11, wherein an annular base (32) of the support element (31), rests, in use, against an adjacent end of the sleeve (24) with a portion of said shaft (25) extending through the base (32).
13. An assembly as claimed in Claim 12, wherein the base (32) houses an annular rim (33) of the seal for sealing between the sleeve (24) and the shaft (25).
14. An assembly as claimed in Claim 12 or 13, wherein the lip portion (34) of the seal (33, 34) for sealing between the sleeve (24) and the shaft (25) extends axially away from the base (32) and the sleeve (24).
15. An adjustable tappet assembly incorporating a sealing device according to any one of Claims 1 to 8.
16. A disc brake incorporating an adjustable tappet assembly according to any one of Claims 8 to 15.

THE UNIVERSITY OF CHICAGO

N 04.05.00

**CLAIMS**

1. A seal device for use in an adjustable tappet assembly for a disc brake for sealing between an internally threaded outer sleeve (24) and an externally threaded internal shaft (25) of the assembly, the device comprising a support element (31) adapted to be carried by the sleeve (24), the support element carrying a seal (33, 34), for sealing between the sleeve (24) and the shaft (25), having a lip portion (34) arranged to engage an unthreaded surface portion of said shaft (25) in sealing relationship for providing a high integrity seal during axial movement of the shaft (25) relative to the sleeve (24).
2. A seal device according to claim 1, wherein an outer surface (30) of the support element (31) serves, in use, to provide a smooth sealing surface for engagement by a lip portion of a further seal (37) carried by adjacent structure.
3. A seal device according to Claim 2, wherein the support element (31) is in the form of a cap having a generally annular skirt (30) adapted to fit, in use, over an end portion of the sleeve (24), the outer surface of the skirt (30) serving for engagement by said further seal (37).
4. A seal device according to any one of Claims 1 to 3 wherein the support element (31) is carried externally by said sleeve (24).

14 04 05 00

5. A seal device according to any one of Claims 1 to 4, wherein an annular base (32) of the support element (31) rests, in use, against the adjacent end of the sleeve (24) with a portion of said shaft (25) extending through the base (32).
6. A seal device as claimed in Claim 5, wherein the base (32) houses an annular rim (33) of the seal for sealing between the sleeve (24) and the shaft (25).
7. A seal device as claimed in Claim 5 or 6, wherein the lip portion (34) of the seal (33, 34) for sealing between the sleeve (24) and the shaft (25) extends axially away from the base (32) and the sleeve (24).
8. An adjustable tappet assembly for a disc brake, the assembly comprising an internally threaded outer sleeve (24), an externally threaded internal shaft (25), and a seal device (31, 33, 34), the seal device having a support element (31) carried by the sleeve (24), the support element (31) carrying a seal (33, 34), for sealing between the sleeve (24) and the shaft (25), having a lip portion (34) arranged to engage an unthreaded surface portion of said shaft (25) in sealing relationship for providing a high integrity seal during axial movement of the shaft (25) relative to the sleeve (24).
9. An assembly according to Claim 8, wherein an outer surface (30) of the support element (31) provides a smooth sealing surface engaged, in use, by a lip portion of a further seal (37) carried by adjacent structure.

11 04 05 00

-10-

10. An assembly according to Claim 9, wherein the support element (31) is in the form of a cap having a generally annular skirt (30) fitted over an end portion of the sleeve (24), the outer surface of the skirt (30) providing the sealing surface engaged by the further seal (37).
11. An assembly according to any one of Claims 8 to 10, wherein the support element (31) is carried externally by said sleeve (24).
12. An assembly according to any one of Claims 8 to 11, wherein an annular base (32) of the support element (31), rests, in use, against an adjacent end of the sleeve (24) with a portion of said shaft (25) extending through the base (32).
13. An assembly as claimed in Claim 12, wherein the base (32) houses an annular rim (33) of the seal for sealing between the sleeve (24) and the shaft (25).
14. An assembly as claimed in Claim 12 or 13, wherein the lip portion (34) of the seal (33, 34) for sealing between the sleeve (24) and the shaft (25) extends axially away from the base (32) and the sleeve (24).
15. An adjustable tappet assembly incorporating a sealing device according to any one of Claims 1 to 8.
16. A disc brake incorporating an adjustable tappet assembly according to any one of Claims 8 to 15.

# PCT

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference  
(if desired) (12 characters maximum)

E036887PGB

**Box No. I TITLE OF INVENTION**

DISC BRAKE SEAL ASSEMBLY

**Box No. II APPLICANT**

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

Meritor Heavy Vehicle Braking Systems (UK) Limited  
21 Suttons Park Avenue  
Suttons Business Park  
Reading  
Berks. RG6 1LA,  
United Kingdom

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:  
United Kingdom

State (that is, country) of residence:  
United Kingdom

This person is applicant  
for the purposes of:

☐ all designated  
States

☒ all designated States except  
the United States of America

☐ the United States  
of America only

☐ the States indicated in  
the Supplemental Box

**Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)**

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

ROBERTS, Paul  
97 Brynglas Road  
Newport  
South Wales  
NP9 5QU  
United Kingdom

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box  
is marked, do not fill in below.)

State (that is, country) of nationality:  
United Kingdom

State (that is, country) of residence:  
United Kingdom

This person is applicant  
for the purposes of:

☐ all designated  
States

☐ all designated States except  
the United States of America

☒ the United States  
of America only

☐ the States indicated in  
the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

**Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE**

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

WAITE, Anthony William and MOSEY, Stephen George  
Marks & Clerk  
Alpha Tower  
Suffolk Street Queensway  
Birmingham B1 1TT  
United Kingdom

Telephone No.

0121 643 5881

Facsimile No.

0121 606 4766

Teleprinter No.

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

*If none of the following sub-boxes is used, this sheet should not be included in the request.*

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

THOMAS, Paul  
Fernlea  
Newport  
South Wales  
NP6 3AY  
United Kingdom

This person is:

- ☐ applicant only  
☒ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

United Kingdom

State (that is, country) of residence:

United Kingdom

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

HOBDAY, Don  
24 Celandine Court  
Ty-Canoe  
Cwmbran  
Gwent NP44 6SU  
United Kingdom

This person is:

- ☐ applicant only  
☒ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

United Kingdom

State (that is, country) of residence:

United Kingdom

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only  
☐ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only  
☐ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

**Box No.V DESIGNATION OF STATES**

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

**Regional Patent**

- ☐ **AP ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☐ **EA Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP European Patent:** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☐ **OA OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line) .....

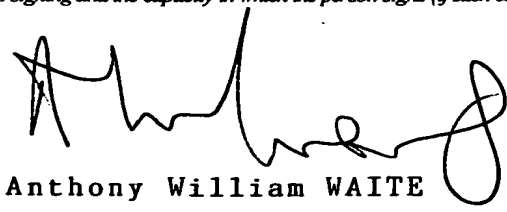
**National Patent (if other kind of protection or treatment desired, specify on dotted line):**

- |                                                                         |                                                                             |
|-------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| <input type="checkbox"/> AL Albania .....                               | <input type="checkbox"/> LS Lesotho .....                                   |
| <input type="checkbox"/> AM Armenia .....                               | <input type="checkbox"/> LT Lithuania .....                                 |
| <input type="checkbox"/> AT Austria .....                               | <input type="checkbox"/> LU Luxembourg .....                                |
| <input type="checkbox"/> AU Australia .....                             | <input type="checkbox"/> LV Latvia .....                                    |
| <input type="checkbox"/> AZ Azerbaijan .....                            | <input type="checkbox"/> MD Republic of Moldova .....                       |
| <input type="checkbox"/> BA Bosnia and Herzegovina .....                | <input type="checkbox"/> MG Madagascar .....                                |
| <input type="checkbox"/> BB Barbados .....                              | <input type="checkbox"/> MK The former Yugoslav Republic of Macedonia ..... |
| <input type="checkbox"/> BG Bulgaria .....                              | <input type="checkbox"/> MN Mongolia .....                                  |
| <input checked="" type="checkbox"/> BR Brazil .....                     | <input type="checkbox"/> MW Malawi .....                                    |
| <input type="checkbox"/> BY Belarus .....                               | <input type="checkbox"/> MX Mexico .....                                    |
| <input type="checkbox"/> CA Canada .....                                | <input type="checkbox"/> NO Norway .....                                    |
| <input type="checkbox"/> CH and LI Switzerland and Liechtenstein .....  | <input type="checkbox"/> NZ New Zealand .....                               |
| <input type="checkbox"/> CN China .....                                 | <input type="checkbox"/> PL Poland .....                                    |
| <input type="checkbox"/> CU Cuba .....                                  | <input type="checkbox"/> PT Portugal .....                                  |
| <input type="checkbox"/> CZ Czech Republic .....                        | <input type="checkbox"/> RO Romania .....                                   |
| <input type="checkbox"/> DE Germany .....                               | <input type="checkbox"/> RU Russian Federation .....                        |
| <input type="checkbox"/> DK Denmark .....                               | <input type="checkbox"/> SD Sudan .....                                     |
| <input type="checkbox"/> EE Estonia .....                               | <input type="checkbox"/> SE Sweden .....                                    |
| <input type="checkbox"/> ES Spain .....                                 | <input type="checkbox"/> SG Singapore .....                                 |
| <input type="checkbox"/> FI Finland .....                               | <input type="checkbox"/> SI Slovenia .....                                  |
| <input type="checkbox"/> GB United Kingdom .....                        | <input type="checkbox"/> SK Slovakia .....                                  |
| <input type="checkbox"/> GD Grenada .....                               | <input type="checkbox"/> SL Sierra Leone .....                              |
| <input type="checkbox"/> GE Georgia .....                               | <input type="checkbox"/> TJ Tajikistan .....                                |
| <input type="checkbox"/> GH Ghana .....                                 | <input type="checkbox"/> TM Turkmenistan .....                              |
| <input type="checkbox"/> GM Gambia .....                                | <input type="checkbox"/> TR Turkey .....                                    |
| <input type="checkbox"/> HR Croatia .....                               | <input type="checkbox"/> TT Trinidad and Tobago .....                       |
| <input type="checkbox"/> HU Hungary .....                               | <input type="checkbox"/> UA Ukraine .....                                   |
| <input type="checkbox"/> ID Indonesia .....                             | <input type="checkbox"/> UG Uganda .....                                    |
| <input type="checkbox"/> IL Israel .....                                | <input checked="" type="checkbox"/> US United States of America .....       |
| <input checked="" type="checkbox"/> IN India .....                      | <input type="checkbox"/> UZ Uzbekistan .....                                |
| <input type="checkbox"/> IS Iceland .....                               | <input type="checkbox"/> VN Viet Nam .....                                  |
| <input type="checkbox"/> JP Japan .....                                 | <input type="checkbox"/> YU Yugoslavia .....                                |
| <input type="checkbox"/> KE Kenya .....                                 | <input type="checkbox"/> ZW Zimbabwe .....                                  |
| <input type="checkbox"/> KG Kyrgyzstan .....                            |                                                                             |
| <input type="checkbox"/> KP Democratic People's Republic of Korea ..... |                                                                             |
| <input type="checkbox"/> KR Republic of Korea .....                     |                                                                             |
| <input type="checkbox"/> KZ Kazakhstan .....                            |                                                                             |
| <input type="checkbox"/> LC Saint Lucia .....                           |                                                                             |
| <input type="checkbox"/> LK Sri Lanka .....                             |                                                                             |
| <input type="checkbox"/> LR Liberia .....                               |                                                                             |

Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

- ☐ .....
- ☐ .....
- ☐ .....

**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

<b>Box No. VI PRIORITY CLAIM</b>		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application: * regional Office	international application: receiving Office
item (1) 26/03/98	9806543.6	United Kingdom		
item (2)				
item (3)				
<input checked="" type="checkbox"/> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): _____				
<small>* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.</small>				
<b>Box No. VII INTERNATIONAL SEARCHING AUTHORITY</b>				
<b>Choice of International Searching Authority (ISA)</b> (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):		<b>Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):</b> Date (day/month/year)      Number      Country (or regional Office)		
ISA / EP				
<b>Box No. VIII CHECK LIST; LANGUAGE OF FILING</b>				
This international application contains the following number of sheets: request : 4 description (excluding sequence listing part) : 7 claims : 3 abstract : 1 drawings : 3 sequence listing part of description : _____ <b>Total number of sheets : 18</b>		This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input type="checkbox"/> other (specify):		
<b>Figure of the drawings which should accompany the abstract:</b> 3		<b>Language of filing of the international application:</b> English		
<b>Box No. IX SIGNATURE OF APPLICANT OR AGENT</b>				
Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).				
 Anthony William WAITE				

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1. Date of actual receipt of the purported international application:  3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:  4. Date of timely receipt of the required corrections under PCT Article 11(2):  5. International Searching Authority (if two or more are competent): ISA /	2. Drawings:  <input type="checkbox"/> received:  <input type="checkbox"/> not received:  6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.

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Date of receipt of the record copy by the International Bureau:	